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FEED GRINDERS
KNIFE GRINDERS
BINDER TWINE
THRESHERS
STONE BURR MILLS
GRAIN DRILLS
CREAM SEPARATORS
DIL AND GAS ENGINES
MANURE SPREADERS
FERTILIZER SDWERS
TRACTORS
WAGONS AND TRUCKS.

INTERNATIONAL

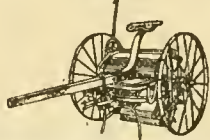
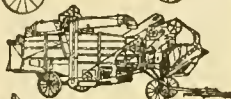
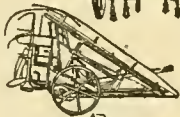
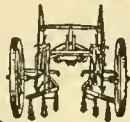
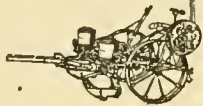
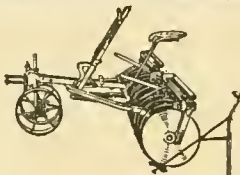
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OF AMERICA



I H C SPRAYING OUTFITS





IHC LINE

GRAIN MACHINES

BINDERS
HEADERS
REAPERS
HEADER-BINDERS

HAY MACHINES

MOWERS
RAKES
HAY PRESSES
SWEEP RAKES
HAY LOADERS
STACKERS
TEDDERS
SIDE DELIVERY RAKES
COMBINED SWEEP RAKES
AND STACKERS

CORN MACHINES

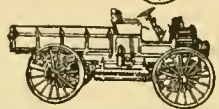
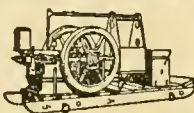
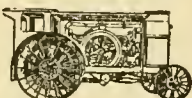
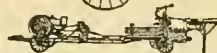
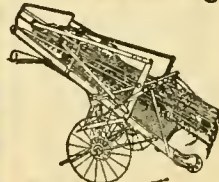
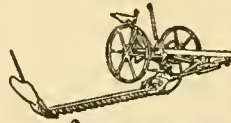
PLANTERS
PICKERS
BINDERS
ENSILAGE CUTTERS
CORNSTALK RAKES
STALK CUTTERS
SHELLERS
CULTIVATORS
HUSKERS AND SHREDDERS

TILLAGE

DISK HARROWS
CULTIVATORS
SPRING-TOOTH HARROWS
PEG-TOOTH HARROWS
COMBINATION HARROWS

GENERAL LINE

MOTOR TRUCKS
FEED GRINDERS
KNIFE GRINDERS
BINDER TWINE
THRESHERS
STONE BURR MILLS
GRAIN DRILLS
CREAM SEPARATORS
OIL AND GAS ENGINES
MANURE SPREADERS
FERTILIZER SOWERS
OIL TRACTORS
FARM WAGONS AND TRUCKS



IHC SPRAYING OUTFITS



International Harvester
Company *of* America
(INCORPORATED)

Chicago :: U S A

IHC SPRAYING OUTFITS



Making Money in Fruit

The problem of the fruit grower of today is simplified by the wealth of information that is at hand for the asking. Practically every state has made a careful study of the subject and has worked out the difficult problems, so that if the proper care is given the trees or vines along the lines laid down by the agricultural colleges, the farmer is practically sure of raising good crops of commercial fruit, barring such conditions as frosts or droughts, which cannot be controlled.

The second consideration is how to market the crops with a profit. Economy in production is under control by the farmer and can be figured very closely. Scientific care of the trees is the first step in economy. It not only results in more perfect fruit, which means an economy in grading and packing, but increases the production per acre to the maximum. Labor is becoming more of a problem every year, and such machines as the power sprayer, mechanical grader, etc., not only help greatly to reduce expenses, but are a necessity in the larger orchards.

Grading and packing are two important points that many farmers underestimate. Fruit that is properly graded and packed always brings top prices.

In nearly every case, properly graded and attractively packed fruit will bring a higher price than fruit of the same quality that is not so carefully handled.



IHC 2½-H. P. Portable Spraying Outfit with Myers' Duplex Pump

IHC SPRAYING OUTFITS

Why It Pays to Spray

Every farmer who owns more fruit trees than enough to supply his own needs, and especially the farmer who contemplates setting out a new orchard or vineyard, should plan to give them some scientific care. The day is past when the farmer can get nearly the same price for poor fruit that his neighbor gets for his perfect fruit. In fact, the grades of fruit are now so standardized by the commission merchants and the big growers that there is little or no profit in marketing poor or second quality fruit. It is not a case of discrimination with the merchant to demand perfect fruit—it is self-protection. There is plenty of first quality fruit grown and the merchant that buys the poorer qualities is injuring his business. It is much the same with the farmer. In order to sell his fruit at a profitable figure it must be perfect, and perfect fruit means spraying. There is nothing that will pay so well if intelligently done. The very enemies that prey on the fruit trees prove a blessing to the farmer who sprays, as their ravages on unprotected orchards enable him to realize prices for his perfect fruit undreamed of before their appearance.

The principles of spraying are few and simple, and the work is not complex, but very easy if done with a power sprayer. Spraying is not an expense as is generally supposed. It not only pays for itself but yields a handsome profit besides.

Orchards are not alone benefited by spraying. Vineyards, truck gardens, and, in fact, nearly all commercial crops return proportionately as great dividends for money invested as do orchards.



81 % Clean



16 % Wormy

Sprayed

A Comparison in one Missouri Orchard

Before spraying, this orchard produced only 17% clean fruit while 83% were wormy
After spraying, it produced 81% clean fruit and only 16% wormy



IHC SPRAYING OUTFITS



Advantages of Power Spraying

The advantages of power spraying are many and cannot be overestimated. It is not only quicker and cheaper than hand spraying, but it is much more efficient. With a power outfit, the steady high pressure that is so necessary to obtain the best results can be maintained at all times, and the ingredients of the spray tank can always be kept thoroughly mixed with the power agitator.

The modern farmer measures the value of his spraying by the results he secures. A satisfactory spraying system must give protection with the least expenditure of money and of labor. The keynote to successful spraying is thoroughness, and thoroughness means 100 per cent of clean fruit. Every wormy or scabby apple, every curled or scaly peach tree increases the cost of production and lessens the quantity of marketable fruit.

A great many of the pests are located within cracks and crevices, under bud-scales and in the calyx cup; or are so oily that they are hard to wet. In the matter of practical control it is these protected pests which must be reached. Any spraying system that will reach these pests will easily control those on the exposed surface. Thoroughness in spraying, therefore, implies penetration.



Titan 2½-H. P. Portable Spraying Outfit Spraying Apple Trees

IHC SPRAYING OUTFITS

Titan Spraying Outfits

In selecting an outfit it should be remembered that the engine is the most important part to investigate, and it is here that Titan outfits excel.

Titan gasoline engines are, first of all, dependable, and will continue to give reliable service long after cheaper engines are worn out. Their simplicity makes them very easy to operate, and for this reason they are especially adapted for spraying, as they require practically no attention after starting, except an occasional oiling. These engines are as light as it is practical to make them for the power they produce and, therefore, there is no unnecessary weight to drag around. Only the highest grade spray pumps are used in connection with Titan engines, so that the purchaser of a Titan spraying outfit is protected in every way and assured of an outfit that will give efficient service for years.

They are adapted to both large and small orchards and are made in several different types to suit the individual ideas of the purchaser and the varied conditions in different parts of the country. They are particularly desirable for the farmer who wishes to use the engine for other purposes than spraying, as this engine can easily be disconnected from the spray pump and a belt pulley attached for general power work.

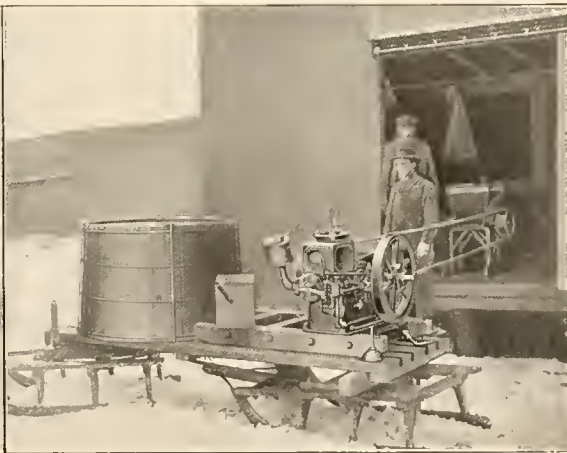


Sizes and Types of Titan Spraying Outfits

- 1-H. P. air-cooled engine, Myers No. 313A pump on skids.
- 1-H. P. hopper-cooled engine, Myers No. 313A pump on skids.
- 1-H. P. air-cooled engine, Myers No. 313A pump on portable truck.
- 1-H. P. hopper-cooled engine, Myers No. 313A pump on portable truck.
- 1-H. P. hopper-cooled engine, Myers No. 436 pump complete with tank.
- 2½-H. P. hopper-cooled engine, Lucas Durite pump on skids.
- 2½-H. P. hopper-cooled engine, Myers No. 446 pump on skids.
- 2½-H. P. hopper-cooled engine, Myers No. 446 pump complete with tank.



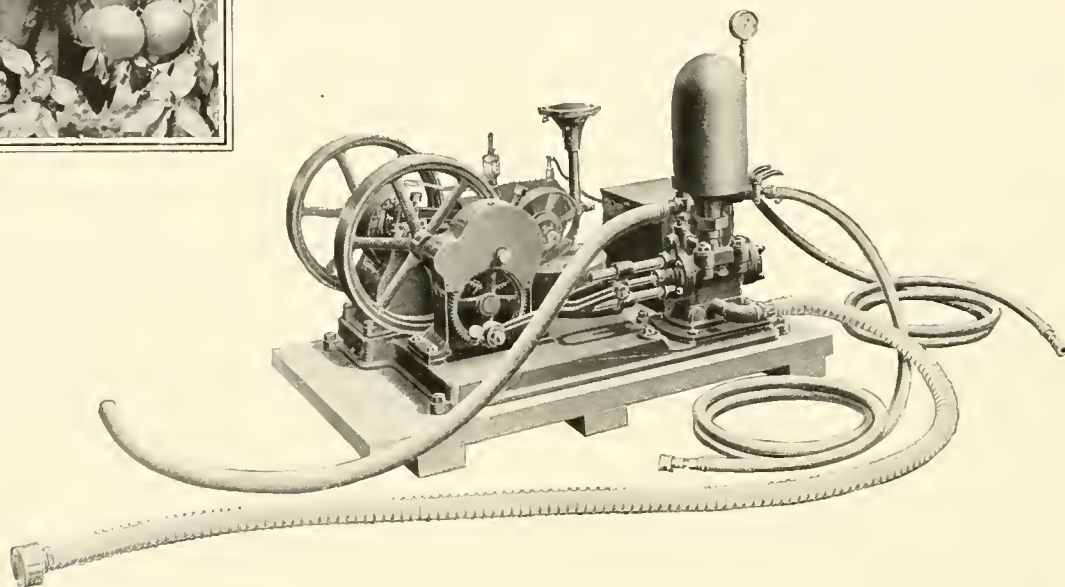
Titan 2½-H. P. Spraying Engine Sawing the Winter's Wood—Pump Removed



Titan 2½-H. P. Spraying Engine Grinding Feed—Pump Removed



IHC SPRAYING OUTFITS



Titan 1-H. P. Air-Cooled Spray Outfit

These outfits are equipped with Tom Thumb 1-H. P. air-cooled engines. They are particularly adapted for spraying orchards where the land is sandy, as the engines are light and require no cooling water.

They will operate on gasoline, motor spirit, naphtha or benzine.

The outfit is equipped with a Myers Jr. gear-drive pump, geared directly to the engine. The pump has a two-inch brass-lined cylinder, ground brass valve seats and brass valves.

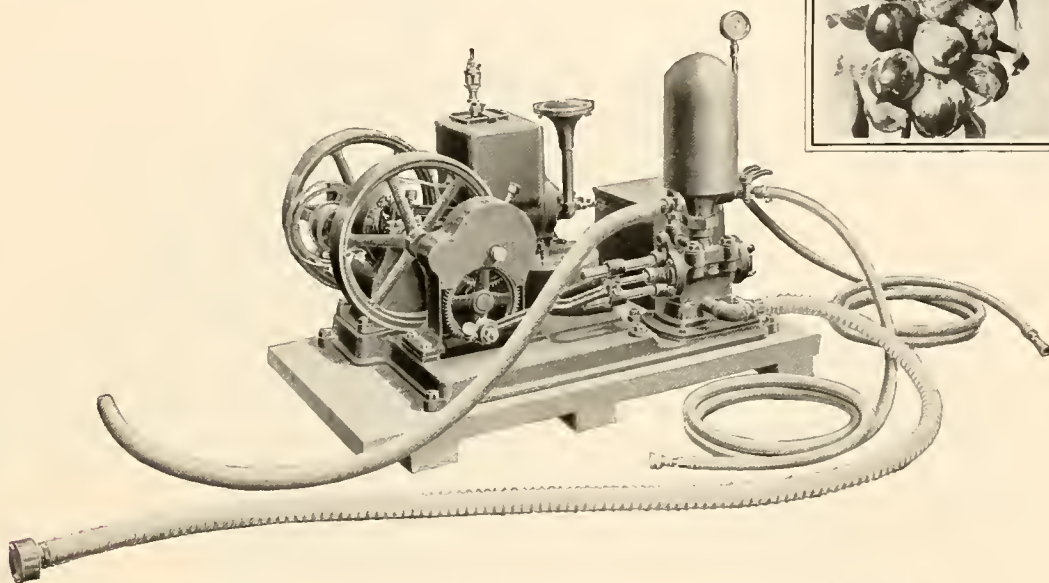
The engine can be disconnected from the spray pump and used for other work upon the farm if desired. They are substantially mounted on wood skids.

Equipment—Titan 1-H. P. air-cooled spray outfits are completely equipped with the following accessories: Galvanized fuel tank, battery box, batteries, spark coil, switch, necessary tools, oil can, oil, eight feet of suction hose with strainer, pressure gauge, relief valve, eight feet overflow hose, twenty-five feet discharge hose, two spray nozzles, three-way cock, and necessary fittings to connect hose to pump.

Special Accessories—Pulleys, a reducing gear and four-inch pulley that can be used for operating cream separators and other machines, and magneto can be furnished on special order.

Engine H. P.	Speed Revolutions per Minute	Engines		Spray Pump					Floor Space		Height Over All Inches	Shipping Weight Complete Pounds
		Dia. of Fly- wheels Inches	Cap'y of Fuel Tank, Gallons	Name	Speed Revolutions per Minute	Dia. of Cyl. In.	Stroke Inches	Cap'y of Pump Gal. per Min.	Length of Skids Inches	Width of Outfit Inches		
1	600	15½	¾	Myers & Bros., 313A	49	2	5	6.6	45¼	28½	30½	485

IHC SPRAYING OUTFITS



Titan 1-H. P. Hopper-Cooled Spraying Outfit Equipped with Special Reducing Gear

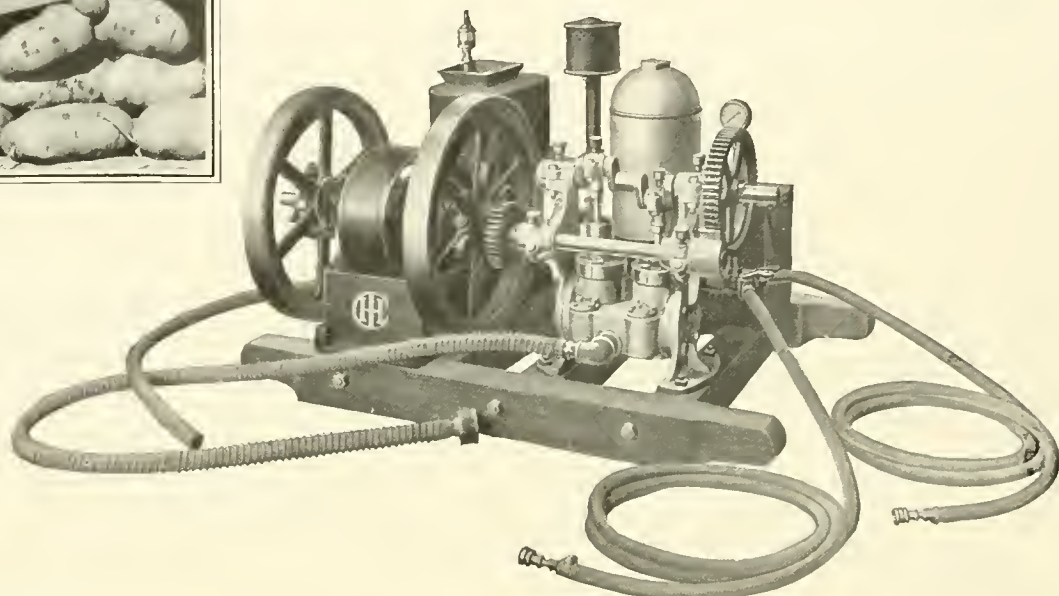
Titan hopper-cooled spray outfits are lighter and more compact than the tank-cooled outfits on account of the hopper-cooling feature and are especially desirable for use in the winter, and in orchards where the ground is soft or sandy. The engine is the Titan hopper-cooled engine mounted on special skids and geared direct to the pump. These engines are economical and reliable under all conditions and will give most satisfactory service. The engine is equipped to operate on gasoline, motor spirit, benzine, or naphtha. The pumps are built for high pressure and designed especially for spraying and are equipped with removable brass-lined cylinders and brass ground valves to prevent corrosion. They are fitted with a check valve between the air chamber and pump, which retains the pressure of the air chamber on the nozzles. When not needed for spraying, these engines can be easily disconnected from the pump and used to good advantage for other work around the farm.

Equipment—This outfit includes the engine and pump with the following accessories: Galvanized fuel tank, muffler, high-grade gear driven magneto, necessary tools, oil can, oil, eight feet of suction hose with strainer, pressure gauge, relief valve, twenty-five feet of discharge hose, and eight feet of overflow hose, two spray nozzles, and necessary hose connections.

Special Accessories—Plain pulleys, a reducing gear and four-inch pulley that can be used for operating cream separators and other machines will be furnished on special order.

Engine					Spray Pump					Floor Space			Shipping Weight Complete, Pounds
H. P.	Type	Speed Revolutions Per Minute	Dia. of Fly-wheel Inches	Capacity of Fuel Tank, Gallons	Name	Speed Revolutions Per Minute	Dia. Cylinder Inches	Stroke Inches	Capacity of Pump Gallons Per Minute	Length of Skids Inches	Width of Outfit Inches	Height Over All Inches	
1	Hor.	600	15½	¾	Myers & Bros., 313A	49	2	5	6.6	45¼	28½	30½	464

IHC SPRAYING OUTFITS



Titan 2 1/2-H. P. Spray Outfit with Myers Pump

This outfit is modern in every respect and is adapted for all power spraying. The outfit consists of the Titan 2 1/2-H. P. hopper-cooled engine geared to a Myers two-cylinder vertical spray pump. The engine operates on gasoline, naphtha, motor spirit or benzine. The pump is completely brass fitted and designed for high-pressure spray work. The cylinders are set vertically so as to allow any sediment to drop to the lower part of the cylinders where it can easily be removed.

The plungers are seamless drawn brass tubing outside packed with heavy brass packing rings.

The valves are brass ground into brass seats and the suction valves are set lower than the discharge valves to give better suction.

The gears are machine cut. The bearings on the shafts and connecting rods are all provided with oil cups. The complete outfit is mounted on substantial wood skids.

These outfits are suitable for high-pressure spraying and will give satisfactory service under all conditions.

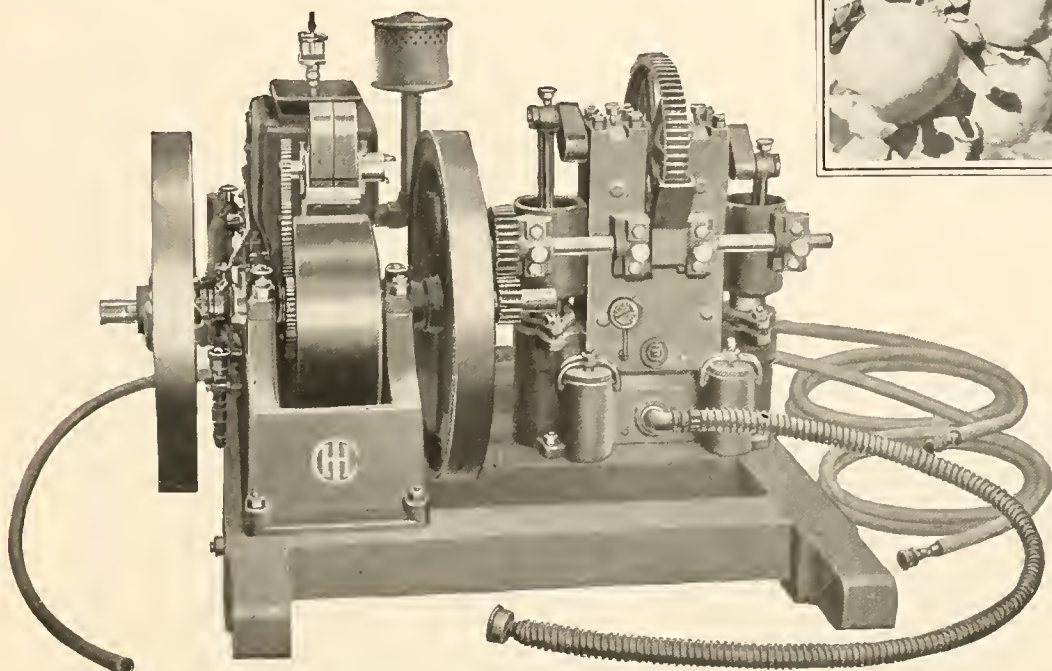
When not used for spraying, the engine can be disconnected from the pump and used for other work.

Equipment—The Titan 2 1/2-H. P. hopper-cooled spraying outfits are equipped complete ready to operate and include the following accessories: Fuel tank, muffler, high-grade gear driven magneto, necessary tools, oil can, can of lubricating oil, strainer, relief valve, pressure gauge, fifty feet of discharge hose, four spray nozzles, two "Ys" for discharge hose (both alike), one shut-off valve, eight feet of hard rubber suction hose, eight feet of overflow hose, and necessary fittings.

Special Accessories—Special size pulleys, friction clutch pulleys, etc., can be supplied on special order.

Engine						Pump					Complete Outfit Approx. Shipping Weight
H. P.	Speed Rev- olutions per Minute	Flywheels		Capacity of Fuel Tank, Gal.	Approx. Shipping Wt., Lbs.	Cylinders			Gear Ratio	Weight of Pump Lbs.	
		Dia. In.	Face, In.			Number	Dia. In.	Stroke In.			
2½	500	22	3	3	525	2	2½	3	5 to 1	188	1000

IHC SPRAYING OUTFITS



Titan 2 1/2-H. P. Spray Outfit with Lucas Pump

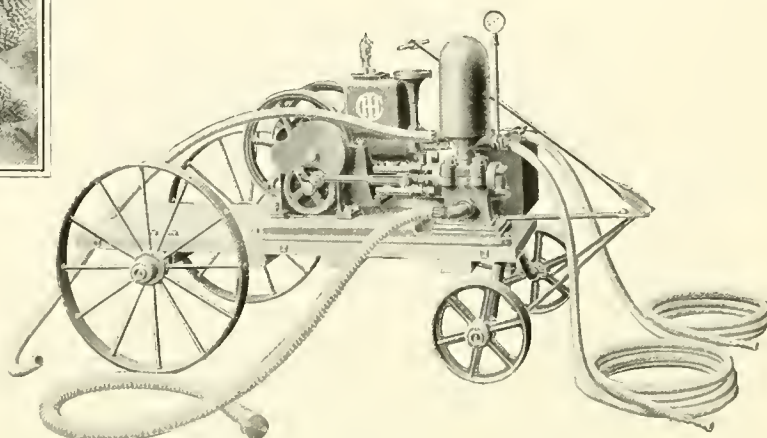
This outfit is adapted for spraying large orchards, vineyards, etc. The engine is the Titan 2 1/2-H. P. hopper-cooled engine, with machine-cut gearing for direct connecting to a Lucas Durite two-cylinder vertical pump. The engine operates on gasoline, naphtha, motor spirit or benzine. The pump is exceptionally well built. The connecting rods are cast steel. The crank pins are phosphor bronze. The pump is brass fitted throughout, with brass covered plungers, brass valve seats and brass valves with a removable rubber disk. The valve seats are large in area and self cleaning. The plungers are outside packed with deep stuffing boxes and have outside guides so that there is little side wear. The discharge can be taken from either side. This outfit is built for the highest class service and will carry a steady pressure of 250 lbs. When not used for spraying, the engine can be disconnected from the pump and used for other work.

Equipment—The Titan 2 1/2-H. P. hopper-cooled engine and Durite pumps are furnished complete, mounted on skids, with the necessary gearing and the following accessories: Galvanized fuel tank, muffler, pulley, high-grade gear driven magneto, necessary tools, oil can, oil, eight feet suction hose with strainer, pressure gauge, relief valve, eight feet overflow hose, and fifty feet discharge hose with four spray nozzles, one shut-off valve, and necessary hose connections.

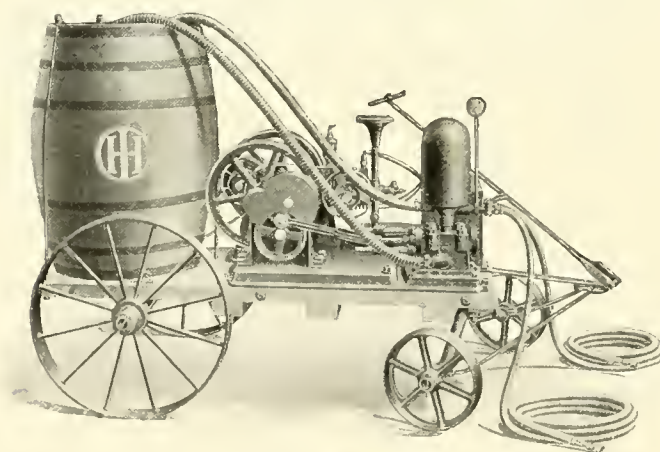
Special Accessories—Special size pulleys, friction clutch pulleys, etc., can be furnished on special order.

Engine						Pump						Complete Outfit Approx. Shipping Weight
H. P.	Speed Revo- lutions per Minute	Flywheels		Capacity of Fuel Tank, Gallons	Approx. Shipping Weight, Lbs.	Cylinders			Capacity Gal. per Minute	Rate of Capacity Lbs. per Sq. Inch	Weight of Pump, Lbs.	
		Dia. Inches	Face Inches			No.	Dia. Inches	Stroke, Inches				
2½	500	22	3	3	525	2	2½	4	10	250	220	1225

IHC SPRAYING OUTFITS



Titan 1-H. P. Hopper-Cooled Mounted Spraying Outfit

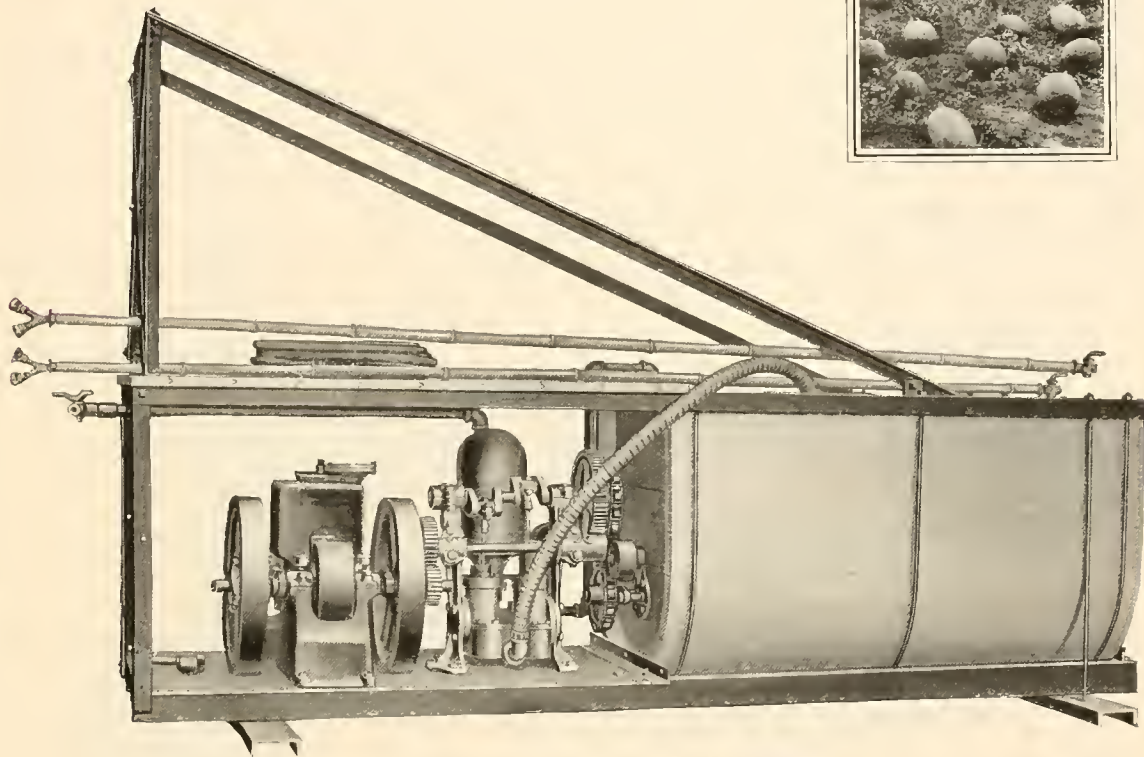
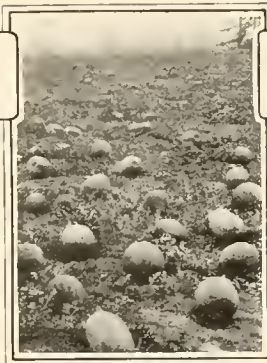


Titan 1-H. P. Air-Cooled Mounted Spraying Outfit

The Titan 1-H. P. mounted spraying outfit consists of either the 1-H. P. air-cooled spraying outfit or the 1-H. P. hopper-cooled outfit, securely mounted on a four-wheel hand truck. This is an excellent outfit for spraying small orchards, vineyards, gardens, etc., as it can be hauled by hand and operated by one man. Then, too, it can be used as a portable engine to operate other machinery, when not needed for spraying, as the engine can be easily disconnected from the pump. The truck is substantially constructed with iron wheels and axles and iron hand tongue. The front wheels turn under the truck so that the outfit can be turned in its own length. No barrel is furnished with this outfit. In ordering state plainly which engine is desired.

Length without Tongue, Inches	Width, Inches	Height to Top of Engine, Inches	Tread of Truck, Inches	Shipping Weight with Air-Cooled Engine, Pounds	Shipping Weight with Hopper-Cooled Engine, Pounds
60	38 $\frac{3}{8}$	40 $\frac{1}{4}$	31 $\frac{7}{8}$	710	730

IHC SPRAYING OUTFITS



Titan 1-H. P. Complete Portable Spraying Outfit

This outfit consists of a steel frame on which is mounted a 100-gallon tank, a platform with steel hand rails, and a Titan 1-H. P. hopper-cooled engine geared to a Myers No. 436 spray pump and power agitator and equipment.

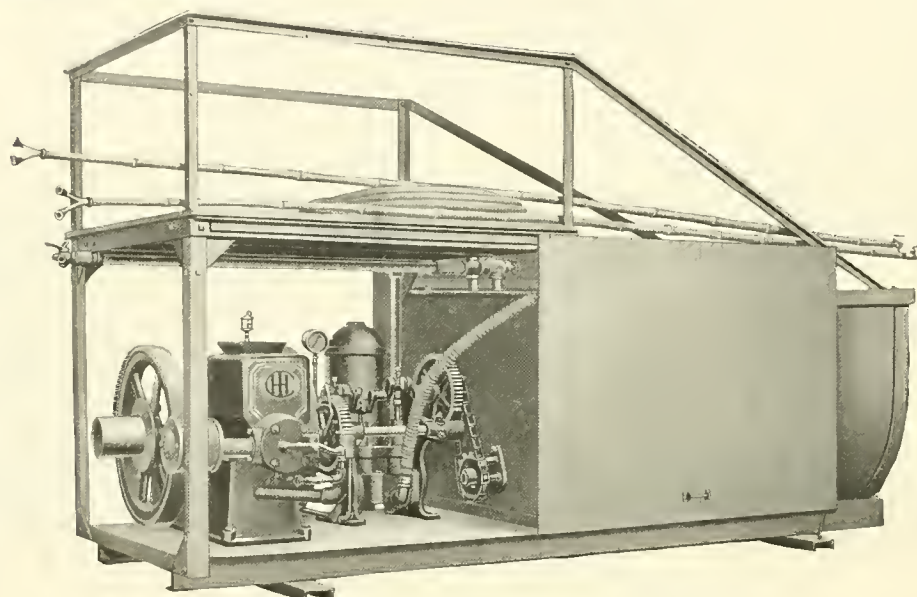
The pump is of two-cylinder vertical construction with brass-lined 2-inch cylinders, and brass valves and seats. The hand railing can be folded up if desired when spraying trees with low branches or for storage. The engine and pump are protected from the spray by heavy side curtains. The frame is made with a channel bar at each end to fit over the wagon bolsters, and will fit any narrow or wide track wagon. The equipment includes:

One 50-foot lead of $\frac{3}{8}$ -inch Spray Hose.
 One 10-foot lead of $\frac{3}{8}$ -inch Spray Hose.
 10-foot Wire-bound Suction Hose.
 Two 10-foot Bamboo Pipe Extensions complete with Lever Shut-off.
 Four Fembro Nozzles (two 45 Degree and two Straightaway).

Two Brass Y's. (Fig. 1560).
 Rotary Agitator.
 Cut-offs for discharge lines.
 Relief Valve, Pressure Gauge and Strainer.
 All assembled ready for use except mounting the engine.

Length of Frame Inches	Width of Frame Inches	Height of Tower Above Sills, Inches	Capacity of Tank Gallons	Approximate Shipping Weight With Pump and Engine Pounds
96	26½	26	100	1100

IHC SPRAYING OUTFITS



Titan 2 1/2-H. P. Complete Portable Spraying Outfit

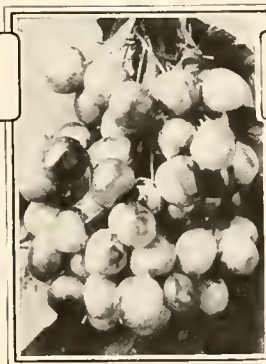
This outfit consists of a steel frame, on which is mounted a 200-gallon cypress spray tank, equipped with a rotary agitator, chain driven from the pump shaft. A Myers duplex high-pressure pump with two and one-half-inch cylinders geared to the Titan 2 1/2-H. P. hopper-cooled engine with complete equipment. The roof over the engine and pump forms a platform on which the operator can stand and is enclosed by an angle steel hand railing. The engine and pump are protected from the weather and spray mixture by a sliding door on each side. A channel bar on each end fits over the wagon bolsters and prevents the outfit from sliding forward or backward. This outfit will fit on any narrow or wide track wagon. The equipment includes the following:

One 50-foot lead of 3/4-inch Spray Hose.
 One 10-foot lead of 1/2-inch Spray Hose.
 10-foot Wire-bound Suction Hose.
 Two 10-foot Bamboo Pipe Extensions complete with Lever Shut-off.
 Four Fembro Nozzles (Two 45 Degree and two Straightaway).

Two Brass Y's. (Fig. 1560).
 Rotary Agitator.
 Cut-offs for discharge lines.
 Relief Valve, Pressure Gauge and Strainer.
 All assembled ready for use except mounting the engine.

Length of Frame Inches	Width of Frame Inches	Height of Tower Above Sills, Inches	Capacity of Tank Gallons	Approximate Shipping Weight With Pump and Engine Pounds
112	26	37	200	1535

IHC SPRAYING OUTFITS



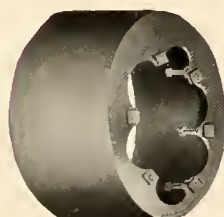
Pump Jacks

Titan pump jacks are built in three types; the standard type for mounting on the pump direct, the walking beam type, and the belted type mounted separate from the pump. These jacks are all built heavy and will outlast the light weight pump jacks usually sold for farm service. The No. 1 standard pump jack is used extensively for pumping water for spray work.

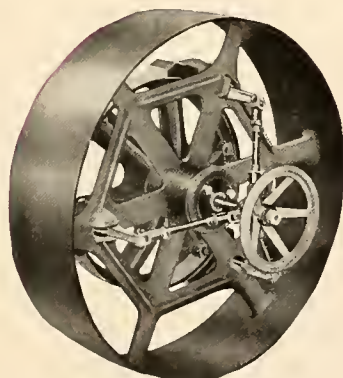


No. 1 Standard Pump Jack

Webster Magneto



Plain Pulley



IHC Friction Clutch Pulley

Wizard Magneto

When specially ordered, the Wizard magneto can be furnished for one-H. P. air-cooled engines. This magneto is comparatively cheap, and may be easily placed on the engine. It is driven by friction contact with the flywheel of the engine. Through its use it is often possible to start the engine in warm, dry weather without the aid of batteries, inasmuch as the fields are permanent magnets.



Wizard Magneto

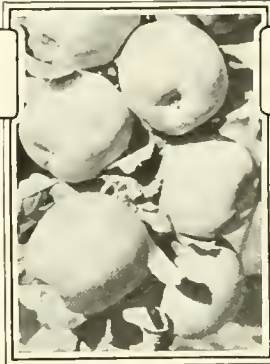
Plain Pulleys for Titan Engines

Diameter	Face		Diameter	Face	
	1-H. P.	2½-H. P.		2½-H. P.	
3 inches	2½ inches	5½ inches	16 inches	5½ inches	
4 inches	2½ or 5 inches	5½ inches			
5 inches		5½ inches			
6 inches	2½ or 5 inches				
7 inches		5½ inches			
8 inches		7½ or 5½ inches			
9 inches		5½ inches			
10 inches		5½ inches			
12 inches		5½ inches			
14 inches		5½ inches			

Note: A complete pulley arrangement for driving a cream separator, consisting of a reducing gear and a 4-inch pulley with a 2⅜-inch face on the 1-H. P. and a 3-inch pulley with 2⅜-inch face on the 2½-H. P. engine, can be supplied on special order.

Friction Clutch Pulley for 2½-H. P. Engine

Diameter	Face
10	4½
12	4½
14	4½
16	4½



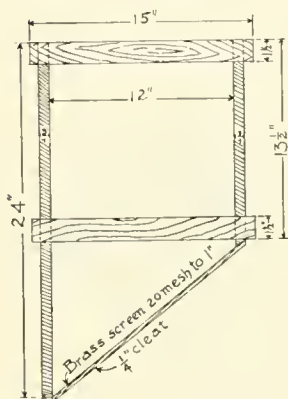
IHC SPRAYING OUTFITS



The Hydrometer

This is an instrument similar to those used in testing acids in dairy work, but with a different range. It is used in determining the density of concentrated solutions preparatory to dilution. It is not intended as a float in the diluting tank to indicate when the proper amount of water has been added, and it is not reliable for such service.

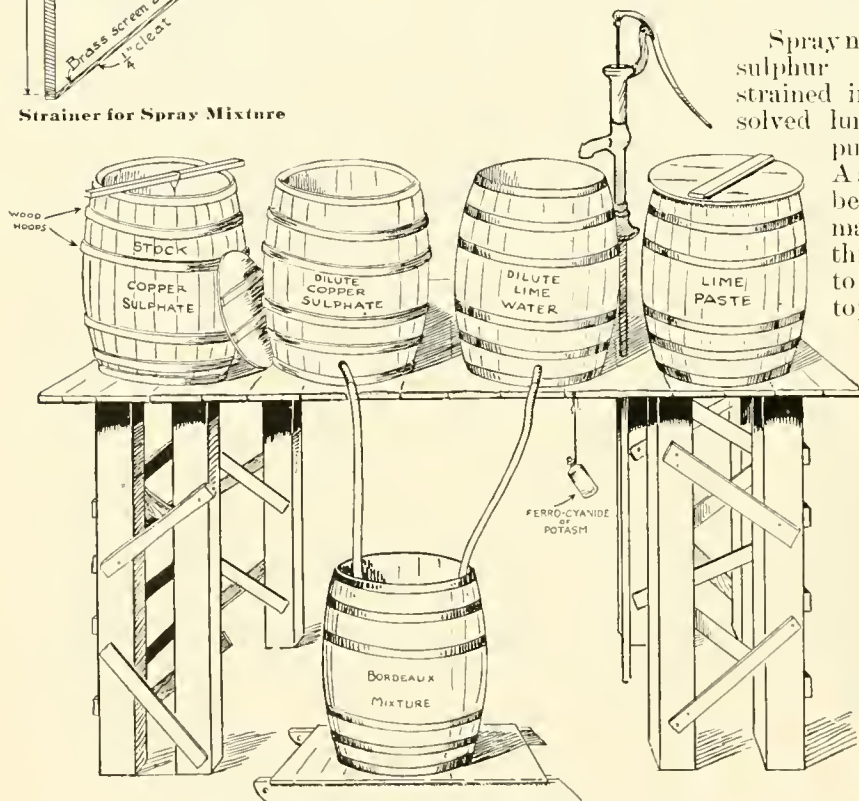
These instruments are graded or marked in two or more scales, the most important of which are the specific gravity and the Beaume. It is preferable to have both scales on the same instrument. Densities are expressed by the former in decimals and by the latter in degrees. The Beaume scale may be somewhat easier to read, but the other is more convenient to use, inasmuch as the required dilutions can be obtained directly from it. A desirable range is from 1.000 to 1.330 on the specific gravity scale, or its equivalent from 0 to 36° Beaume. They are simple in use and indispensable in the accurate dilution of any concentrated solution.



Strainer for Spray Mixture

Strainer for Spray Mixtures

Spray mixtures, especially lime-sulphur mixtures, should be strained in order that no undissolved lumps can get into the pump and clog the valves. A simple strainer can easily be made by anyone. The material that will not pass through the screen drops to the bottom, leaving the top of the screen clear.

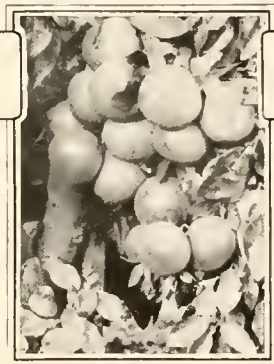


A Convenient Method of Mixing Spray Mixtures



Hydrometer for Liquids Heavier than Water

IHC SPRAYING OUTFITS



What Spraying Does

Before starting to spray, a careful study should be made of the insects or fungi you have to deal with, in order to determine the best mixture as well as the best time to spray.

The man who would be successful in spraying must learn to know the insects and diseases by their appearance and their work so as to apply the right treatment at the proper time.

There are three general kinds of enemies to combat—insects which gnaw or eat into the plant; insects which suck the plant juices, and fungous diseases. Insects that gnaw or eat the plant are killed with poison spray such as arsenic, hellebore, etc. The entire plant or tree is covered with the spray so that the insects will have to eat the poison.

Insects that suck are more difficult to dispose of. The method usually adopted is to drench them with an emulsion, or one of the scale washes. A coating of one of these mixtures is sprayed on them, and kills them by smothering, as they breathe through little spiracles along the sides of their bodies.

The fungus growths are parasitic, consisting of plants of low form, which live on other living plants and kill the vegetation they attack by filling up their pores or respiratory organs. They spread by small dust-like bodies called spores, which correspond to the seed in higher forms of plant life. These spores are born on the surface and produced in great numbers. Each one is capable of starting a new fungus growth. They are carried from one plant to another by means of the wind, water, and insects. Chemicals which stop their growth are used to combat fungus diseases.

The most effective spraying is preventive spraying. If the foliage and fruit be thoroughly coated with poison or fungicide before the first chewing insect or the first fungus spore lights upon them, the insect will be destroyed at its first meal and the first fungus infection will be prevented. When insects or fungous diseases have become plentiful, both are more difficult to control. Spray to coat the foliage, twigs, or fruit with poison or fungicide just before an attack by chewing insects or fungi is expected.

Thoroughness and timeliness are the two most important points in successful spraying. Remember, it costs just as much to do a poor job of spraying as it does to do a thorough one, and the results are usually widely different.

Spraying Suggestions

Do not spray when trees are in full bloom, as it will reduce the crop and kill the bees, which are valuable friends of the fruit grower.

Do not spray immediately after a rain.

It is better to spray on a still day, or, if there is a wind, to spray only on the windward side of the trees, spraying the other side on the first still day, or when the wind changes.

Wooden tubs, barrels, or earthen jars should be used when preparing the mixtures which contain copper sulphate, corrosive sublimate or arsenate of lead.

Carefully label all substances used in making spraying mixtures and keep them some place where they cannot be used by mistake.

Arsenical sprays should not be applied to fruits, etc., within two weeks of the time they are to be used as food.

When through using, the spray pump should be cleaned by forcing water through it.

Keep all spraying apparatus in repair, so that the work will not be delayed at the critical time.

Do not spray indiscriminately, but study the pests you have to combat and adopt the most effective means of destroying them.

IHC SPRAYING OUTFITS



Oyster Shell Scale

Oyster shell scale is an insect having but one generation a year. The winter is passed in the egg state beneath the protecting scales which hatch early in the spring. They crawl about until they find a place suitable, then insert their beaks in the bark and suck the plant juices. They soon begin to form the scale covering which can be easily distinguished by the peculiar shape of the scale which resembles an oyster shell.



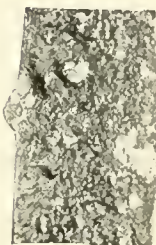
San Jose Scale
highly
magnified



**Oyster Shell
Scale**
highly
magnified

San Jose Scale

The half-grown females survive the winter and breed continuously throughout the summer. The young are born alive and crawl about at first, but soon settle and insert their beaks under the bark and suck the plant juices. Under a magnifying glass they have a dark nipple in the center. These insects multiply very rapidly and soon completely cover the infected twigs and branches, giving them a grayish appearance.



**European Fruit Scale. Twigs infested
and uninfested**



European Fruit Scale

This scale is very similar to San Jose scale; the chief difference to be observed is that the scale is more easily detached from the insect, which looks like a small yellow dot. It is also slower in multiplying than San Jose scale, but if allowed to grow will soon become very destructive.



**Scurfy Scale. Large twig infested with female scale.
Small twig with male. Female scale at
right, highly magnified**



Scurfy Scale

This scale is somewhat similar in shape to the oyster shell scale. It is grayish white in color. They spend the winter in the egg state under the protecting scale covering and hatch out in the early summer, often crawling to a new spot.

Codling Moth

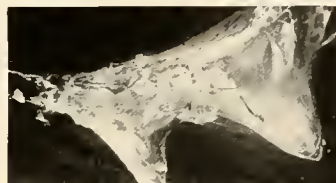
The eggs are laid in the spring usually on the leaves. The worm hatches and crawls to the nearest apple, entering usually at the blossom end. It completes its growth inside the fruit, bores its way out, crawls to a crevice in the tree bark where it makes a nest and spends the winter. In the spring, the moth comes out of the nest, flies away, and lays its eggs on the leaves.



IHC SPRAYING OUTFITS



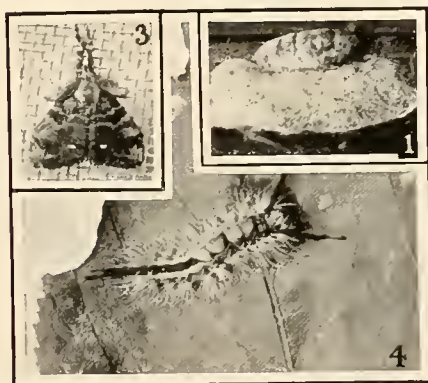
Tent Caterpillar and Web Egg mass at right



Web of Fall Web Worm



Characteristic poses of Canker worm



3. Tussock Moth, male. 1. Female on Cocoon
At bottom, Tussock Caterpillar

does the damage. The caterpillar has two long tufts of black hairs arising from each side of the first body division. Two broods are hatched each year, the first in May or June and the second in August or September. The caterpillar on reaching maturity forms a sort of cocoon of a leaf and some silk is spun from the mouth.



Orchard Tent Caterpillar

This caterpillar appears early in the season and spins a tent-like web from which it crawls to the leaves and feeds, eating the entire leaf and returning to its web at night. It is about two inches long when full grown. The body is black, with a series of white marks along each side, and a white stripe down the back. The web is spun in a crotch and is small to start with, but is gradually increased in size to about six inches in diameter. When the caterpillars reach maturity, they desert the web and become inactive. Later they change their form to moths, which lay eggs in compact masses on twigs, usually encircling the twig.

Fall Web Worm

This caterpillar appears late in the summer and spins a web, usually starting at the tip of a branch. As it enlarges its feeding area, it spins its web to include it, always feeding inside the web. Its method of feeding is to eat the upper and lower portion of the leaves, leaving the framework intact which usually has a brown appearance, when numerous large webs may be found in a single tree. The method of breeding is similar to the tent caterpillar except that the eggs are usually laid on the leaves.

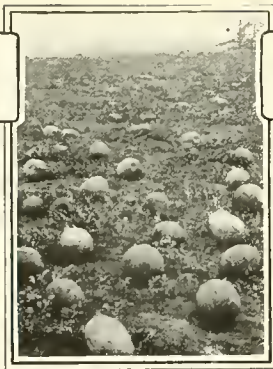
Canker Worm

There are two kinds of canker worms—the spring canker worm and the fall canker worm. The eggs of the spring canker worm are laid in the spring and the others in the fall. Canker worms hatch in the early spring and eat the young leaves and buds. When full grown, they drop to the ground and bury themselves and remain till the following year, when they change in form to moths. The female is wingless and can be prevented from laying eggs on the tree bark by sticky bands applied early in the spring. From the eggs the young worms are hatched.

Tussock Moth

These moths are small, the males are broad-winged and the females are wingless. The moths lay eggs from which are hatched the tussock caterpillar which

IHC SPRAYING OUTFITS



Apple-Leaf Roller and Apple-Leaf Folder

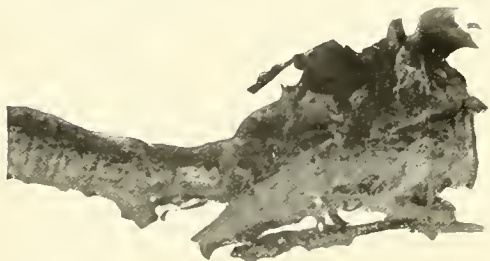
The work of these insects is not particularly dangerous except in nurseries. The leaves are rolled by the apple-leaf roller and folded by the apple-leaf folder. On opening the leaf, the leaf will be found to be partially eaten and a green worm will usually be found.

Apple-Leaf Crumpler

This insect not only attacks apples, but plums and cherries as well. They will usually be detected by the twisted horn-like cases and dead leaves in which it passes the winter in the larval stage. These are found on the twigs and sometimes suspended from the twigs by a silken thread. Early in the spring they emerge and feed on the new leaves and buds; when full grown they return to their nests and pupate, and later emerge as full-grown moths. Egg laying follows and a new lot of larvae to carry them through the winter.



Work of Apple-Leaf Roller



Nest of Apple-Leaf Crumpler

Plum Cureulio

This insect is very destructive and attacks apples and cherries as well as plums.

The first injury is done by the small snout beetle. It deposits its eggs just beneath the skin of the young fruit and then cuts a small piece from the skin of the fruit just below them, to keep the growing fruit from overgrowing them. The young grub hatches from the eggs and burrows into the fruit to feed. On reaching maturity, they fall to the ground and go into the larval stage, later emerging as beetles.



Work of Cureulio



Cureulio Worm

Plum Gouger

This insect is closely related to the plum cureulio. This insect is a beetle of a lighter brown than the cureulio and considerably larger. The cureulio has two pronounced lumps on its wing covers which are lacking in the gouger. This beetle causes great injury by eating the ovule in the flower which would ultimately become fruit. The eggs are deposited like the cureulio, but as soon as the worm hatches it burrows into the pit of the fruit, eats the seed, and goes into the larval state. Later it changes to a full-grown beetle, which emerges from the fruit.

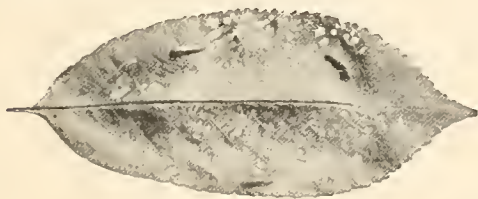


Work of Gouger Worm



Gouger Beetle

IHC SPRAYING OUTFITS

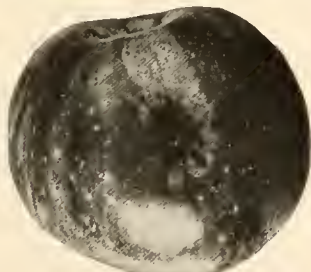


Cherry and Pear Slug

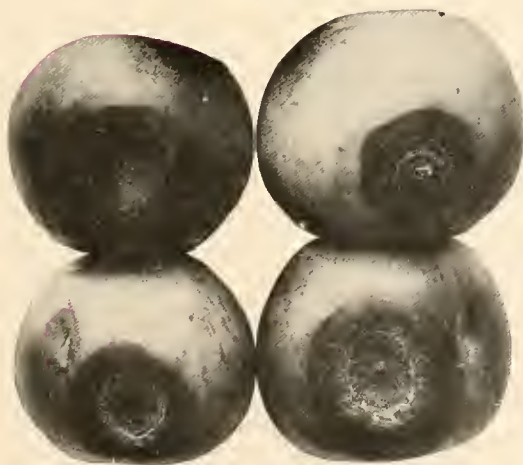


Saw Fly Worms

Currant Aphis



Apple Blotch



Bitter Rot

Cherry and Pear Slug

The adult is a four-winged fly, small in size and dark in color, appearing early in the spring. As soon as the leaves are out, it lays its eggs in the tissue of the leaves. The young slugs that are hatched are small, dark green, with a shiny coating. They feed on the leaves, eating all but the frame work. They work in the spring and again later in the summer. When full grown they turn to a bright yellow color.



Currant Aphis

This is a small lice appearing annually. Its presence is first noted by the partial curling and crumpling of the leaves, followed by a red discoloration of the upper surface. The insect causes the damage by feeding on the juices of the plant, rendering the leaves incapable of performing their normal functions. If very numerous the growth of the canes may be partially checked.

Currant Saw Fly

The saw fly is a four-winged fly, which appears early in the spring and lays its eggs along the veins of the leaves on the under side. They soon hatch into small green worms, which rapidly eat the leaves, except the principal frame work. Later, they drop to the ground and make a thin, tough cocoon, from which a second brood of saw flies hatch.

Apple Blotch

Apple blotch is often mistaken for bitter rot, but is less completely destructive of the fruit. It is a fungus disease and can be controlled by spraying with Bordeaux mixture two or three times after the petals have dropped from the flowers.

Bitter Rot

This disease is called bitter rot on account of the bitter taste of the diseased fruit. This is a germ disease, living through the winter as a canker on the twigs. The rot attacks the fruit skin at any point. The diseased part soon becomes sunken and turns black, while pimples appear in small concentric rings and soon burst, yielding pink material full of microscopic germs which spread to the fruit.

PLANT OR TREE	DISEASE OR INSECT	REMEDY	WHEN TO SPRAY				REMARKS AND CAUTIONS
			FIRST SPRAYING	SECOND SPRAYING	THIRD SPRAYING	FOURTH SPRAYING	
Apple	Bitter rot	Soda Bordeaux or ammoniacal copper carbonate.	With first appearance of rot.	One to two weeks after first.	Two weeks later	Not required if Bordeaux precedes.	These follow Bordeaux for scab; danger on fair-skinned apples.
	Scab	Bordeaux in mixture I.	As buds are swelling.	Just before blossoms open	Just after blossoms drop.	7 to 10 days later	
	Bud moth	Arsenate in Bordeaux	With opening of buds.				
	Canker worm	Arsenate of lead alone	When young worms appear	Two or three days later	Same as second if worm is there.		
	Codling moth	Arsenate in Bordeaux 1 lb. to 50 gallons.	As soon as blossoms fall	7 to 10 days later	Usually second week in July	About last week in July. Arsenate of lead on light-colored fruit	17, 18 or 19 in Bordeaux not so effective as arsenic of lead.
	San Jose scale	Lime-sulphur	Late in winter, early in spring or late in fall.	June 1-15, with 13 or 16			In case of bad infestation spray in fall and repeat in spring. Don't use strong emulsion or oil when trees are in full leaf.
	Oyster shell scale	Lime-sulphur	Early spring with 14		For oyster shell scale Aug. 1-15 with 13 or 16.		Use arsenites in late summer only.
	Starry scale	Kerosene emulsion	When larvae appears (use as powder).	Same as first	Same as first	Same as first	Repeat 3 or 4 times. Burn rusted brush in fall.
	Asparagus beetle	Pyrethrum	After cutting crop	Ten days later	Ten days later	Ten days later	
	Asparagus rust	Bordeaux I	With first appearance of worms	Whenever worms are observed	Same as second	Same as second	1 oz. to 3 gallons water, or dust 1 to 10 of flour.
Cabbage and Cauliflower	Cabbage worm	Pyrethrum	With first appearance of worms	Whenever worms are observed	Same as second	Same as second	Keep leaves well covered in plant bed.
	Leaf spot or leaf blight.	Bordeaux I	On young seedlings	Repeat on seedlings	Before or after transplanting.	Two weeks later	
Celery	Rust and other fungous diseases.	Bordeaux	When planted out, dip in solution.	7 to 10 days later spray with same.	Repeat at intervals of a week or 10 days until blossoms open.	While in bloom, spray every week with the dilute copper sulphate solution	
	Leaf spot	Bordeaux II	When leaves are unfolding	Two weeks later	2 or 3 weeks after second		First after blossoming. Often treated after crop is gathered.
Cherry	Rot	Bordeaux I and II	Before blossoming I	After blossoms drop, II on fruit	Two weeks later II	3 or 4	Use 3 or 4 when fruit is large. Difficult to reach apices. Use 1 lb. soap to 4 gallons water.
	Aphis	Soap solution	On first appearance of aphids				Air-slacked lime may be used.
Cherry	Cherry slug	Arsenate of lead in Bordeaux I.	After fruit harvest as slugs appear.	Repeat if slugs remain			Avoid strong solutions; use no arsenicals except arsenate of lead.
	Curculio	Arsenate of lead in Bordeaux I and II.	Before blossoming in I	As blossoms dry up in II	One week later in II		Repeat as necessary.
Cucumber	Anthrax	Bordeaux	When plants begin to vine	Two weeks later	Two weeks later	Two weeks later	Repeat at weekly intervals.
	Dusky Mildew	Bordeaux	July 25 to August 1	Eight to ten days later	Eight or nine days later	Eight days later	Apply to fruit carefully.
Cucumber	Spot of fruit	Bordeaux I	After first blossoms	Ten days later	Two weeks later	Two weeks later	Fifth one week after fourth.
	Spot of fruit	Arsenate of lead in Bordeaux I. Or sprinkle and dust I.	Soon as plants appear	One week later	One week later	One week later	Fourth necessitates washing fruit.
Cucumber	Cucumber beetle	Bordeaux	Soon as plants appear	One week later	One week later	One week later	
	Leaf spot	Bordeaux	As leaves are unfolding	Two weeks later	Two weeks later	Two or three weeks later	
Currant	Plant bug	Kerosene emulsion	Early in June if necessary	Two weeks later	Repeat as second	Repeat as second	Worms on under side of leaves.
	San Jose scale	Lime-sulphur	Spray in May	Early in June if necessary	Repeat as second	Repeat as second	Lime-sulphur for first when scale is present instead of Bordeaux I.
Currant	Worm	White Hellebore	As with the apple	In spring as with apple	Repeat as second	Repeat as second	Cover fruit thoroughly.
	Leaf curl	Bordeaux I, or I	In fall or March, Bordeaux 1, 6 or 14.	As buds are opening 1, 6 or 20.	Two weeks later	Two weeks later	Every 7 to 10 days repeat. Destroy mummies, 3 may be used 4th.
Peach	Pustular spot	Bordeaux II	Just after calyx drops	Two weeks after first	Three or four weeks later II	As fruit begins to color II	Repeat third in two weeks
	Brown rot	Bordeaux I and II	As buds are swelling 1 or 14	Just after calyx drops II	Two weeks later	Two weeks later	Use half usual amount of poison.
Peach	Scab	Bordeaux I, 1 or 3	As buds are swelling	After calyx drops Bordeaux II.	Two weeks later	Two weeks later	Bordeaux may make russet fruit
	Bud moth	Arsenites in Bordeaux I.	With opening of buds.	After calyx drops Bordeaux II.	Two weeks later	Two weeks later	Bordeaux after second may russet the fruit
Peach	San Jose scale	Lime-sulphur	In late fall or early spring	Two weeks later, 1 or 3	Two weeks later 3	Two weeks later 3	17, 18 or 19 in Bordeaux not so effective as arsenate of lead.
	Leaf blight	Bordeaux I or 6	Before blossoms open	After blossoms drop	Same as second if worms there	Same as second if worms there	Treatment similar to the apple.
Pear	Scab	Bordeaux I	When leaves are half grown	When blossoms drop	Seven to ten days later	Seven to ten days later	
	Bud moth	Arsenites in Bordeaux I	With opening of buds	When young worms appear	Repeat if slugs remain.	Repeat if slugs remain.	
Pear	Canker worm	Arsenate of lead	When young worms appear	When blossoms fall	When slugs appear	When slugs appear	
	Codling moth	Arsenites in Bordeaux I	When blossoms fall	In winter or early spring			
Pear	San Jose scale	Lime-sulphur	In winter or early spring	When slugs appear			
	Slug	Arsenites in Bordeaux I or dust with slaked lime.	When slugs appear				

Pum.	Brown rot	Bordeaux I and II, or 4.	As buds are swelling I or 14.	Just after calyx drops I. On Jap. and Am. varieties II after leaves are grown.	Three or four weeks later I. Three weeks later if needed.	As fruit begins to color use 3 or 4.	Every 7 to 10 days repeat 4th. Destroy all mummies.
	Shot-hole fungus	Bordeaux I and II	When leaves are half grown.	Three weeks later	Three weeks later if needed		Protect to end of the season. Jar trees, gather and destroy curculio and stung plums.
	Curculio	Arsenate of lead in Bordeaux I.	With starting of buds.	Just after calyx drops I.	Five days later		Use 1 lb. soap to 6 gal. water.
	Aphis	Soap solution	On appearance of aphid				
Potato.	San Jose scale	Lime sulphur	In late fall or early spring				
	Early blight	Bordeaux I.	When plants are 6 in. high	Two weeks later	Two weeks later	Two weeks later, if needed	Careful seed selection is desirable.
	Late blight	Bordeaux I.	July 15th to 20th	Two weeks later	Two weeks later	Two weeks later	Repeat at two-weeks' intervals until crop is mature.
	Blister beetle	Whale oil soap or dilute Chloro-naphtholeum.	When beetles appear	Repeat if necessary			Use 1 lb. soap to 6 gal. water.
Raspberry and Blackberry	Colorado beetle	Arsenates alone or in Bordeaux I.	When beetles or young appear	Repeat when necessary			Arsenate of lead, 3 lbs. to 50 gallons water, for Colorado beetle.
	Flea beetle	Bordeaux I with I3	When beetles appear	Repeat if necessary	As for first and second		Spray when beetles appear.
	Anthraxnose	Bordeaux I and II	Before leaves open use I.	II on young canes 6 in. high	Repeat one week later		Spray no larlar leaves on bearing canes.
	Leaf spot	Bordeaux I	When leaves are half grown	Two weeks later	Two weeks later		
Strawberry	Rust	Bordeaux	When growth begins in spring	As first fruits are setting	Two weeks later	When last fruits are harvested.	
		Ammoniacal copper carbonate.			As first fruits are ripening.		
	Leaf spot	Bordeaux I.	As leaves are unfolding	Two weeks later	Two weeks later	Two or three weeks later	This remedy is very successful. Bordeaux coats fruit 3rd spraying. Sodium sulphid is substitute for B.
	Mildew	Bordeaux I or 3.	Before leaves open I.	After blossoming I.	Potas. sulphid 2 weeks later		
Gooseberry	Worm	White hellebore	When worms first appear.			Ten days later, Bordeaux.	
	Anthraxnose	Bordeaux I.	Just before buds open.	Just before blossoming	Just after fruit basket.		
	Berry moth	Arsenate of lead with Bordeaux I.	Before blooming.	After fruit has set.	July 1 to July 15.		
	Downy and powdery mildew.	Bordeaux I.	Just before blossoming	After fruit has set.	Ten to fourteen days later		Covered by spraying for anthracnose or rot.
Grape.	Black rot	Bordeaux I.	Just before blossoming Bordeaux I or I.	Repeat just after fruit has set.	Repeat seven or eight days later.	Repeat seven or eight days later.	Follow by two or three sprayings with Soda Bord. or Am. Cop. Carb.
	Leaf hopper	Kerosene emulsion.	Before young can fly.				
	Downy mildew, striped beetle.		See Cucumber.				
	Louse	Kerosene and water, 5 or 10 per cent solution, or whale oil soap (b).	Every 10 days till the pest is checked.				
Melon.	Purple scale, red scale of Cal. long scale, red scale of Florida, oleander scale, orange chionaspis, chaff scale, black scale, soft scale, hemispherical scale, Florida wax scale, barnacle scale, fluted scale, mealy bug.	Kerosene or distillate emulsion.	When scales are in immature stages and during breeding season. Also by fumigating trees with hydrocyanic acid gas.	Two weeks later	Three weeks later.		
	Rust mite of the orange, and silver mite of lemon.	Kerosene or distillate emulsion.	When spraying for scale, but to destroy the eggs mix flowers of sulphur into a paste with cold water, then add 10 pounds of pulverized caustic soda (38 per cent). Water must be added from time to time, to prevent burning until a concentrated solution of 20 gallons is obtained. Use 2 gallons of this concentrated solution with every 50 gallons of the spraying solution.				
	Six spotted mite.	Kerosene or distillate	Same as for Rust or Silver Mite.				
	White fly.	Lime-sulphur solution diluted to one pound lime in 20 gallons. Kerosene or distillate emulsion.	When young Gassing is also effective. December to March.	Repeat two or three times if necessary. Repeat 2 or 3 times in winter.	May	Aug. or early in Sept. if sooty mould is found to be spreading to the fruit.	
Orange.			The under surface of the leaves should be thoroughly wetted with the spray and trees should be opened up by pruning. Fumigation with hydrocyanic acid gas is also an effective means of destroying this insect.				

Formulas for Spraying Mixtures

Fungicides

(For Rots, Blights, Mildew, and Other Fungous Diseases)

No. 1. COPPER SULPHATE SOLUTION—Strength I—

Copper Sulphate (Blue Vitriol).....	1 pound
Water.....	15-25 gallons

Dissolve the Copper Sulphate in water when ready for use; or take a gallon of the stock solution. (See Bordeaux Mixture). This strength is to be used only before the buds break. It should never be applied to foliage. For peaches and Japan plums use 25 gallons of water.

No. 2. Strength II.

Copper Sulphate (Blue Vitriol).....	1 pound
Water.....	200-400 gallons

This solution is gaining ground as a substitute for Ammoniacal Carbonate of Copper in spraying ripening fruits, especially plums. At the rate of $\frac{1}{4}$ pound per barrel it is equally effective and seldom injures the foliage appreciably, though it is always better to add a little milk of lime. Use the weaker strength given on peaches and Japan plums. It does not stick like Bordeaux, and must be used about twice as often.

Caution.—The copper solution should be made in wood, glass, or earthen vessels, and should not be prepared in iron or tin. Care should be taken against spraying plants of any kind with lime or poisonous mixtures within four or five weeks of the time they are to be used as food.

No. 3 POTASSIUM SULPHIDE SOLUTION—

Potassium Sulphide.....	$\frac{1}{2}$ to 1 ounce
Water.....	1 gallon

This loses strength in standing and should be used immediately. Keep the Sulphide in a stoppered bottle.

This solution is valuable for the gooseberry and other powdery mildews, for which it seems even more effectual than Bordeaux mixture, although its effects are less lasting. It does not discolor the fruit and is quite harmless.

No. 4. BORDEAUX MIXTURE—Strength I—

Copper Sulphate (Blue Vitriol).....	5 pounds
Water.....	50 gallons
Quicklime (Good stone lime, or fresh "New Process," or ground limes).....	5 pounds

For peaches and Japanese plums, an extra amount of lime should be added, and more water (60 to 70 gallons) should be used.

No. 5. BORDEAUX MIXTURE—Strength II—

Copper Sulphate.....	2 pounds
Quicklime.....	2 pounds

Water to make 50 gallons.

(For use on such trees as have foliage injured by Bordeaux—Strength I.)

Weighing of copper and lime at time of mixing is very inconvenient. Bordeaux mixture is best when used within a few hours after being mixed. Therefore, a stock of mixture of Bordeaux is impracticable. It is, however, practicable to have stock preparations of sulphate of copper and of lime ready for mixing when required. A stock mixture of slaked lime can be kept all summer by keeping it covered with water to exclude the air. The copper sulphate stock solution is easily made by suspending in a bag or basket over night 50 pounds of the sulphate at the surface of 25 gallons of water in a barrel. Thus every gallon dipped out of this "stock" barrel will contain 2 pounds of the sulphate. Always use earthen or wooden vessel.

In mixing Bordeaux it is very important that these strong "stock" mixtures of lime and sulphate be diluted before they are poured together, otherwise a thick, curdled, and coarse-grained Bordeaux results, which quickly settles and clogs the nozzles. Fill the tank or barrel half full of water, then add the required amount of sulphate solution. Have another receptacle in which a dilute milk of lime has been made from the "stock" lime mixture. Pour this diluted lime into the dilute sulphate, testing it at intervals with the ferrocyanide of potassium solution. This test material is a yellow crystal and is easily soluble in water. Ten cents worth dissolved in a pint of water will do for a season's spraying of an average orchard. The cork should be notched or a quill inserted so that the contents will come out in drops. Dip out a little of the Bordeaux mixture in a cup or saucer, and drop the ferrocyanide on it. So long as the drops turn brown on striking the mixture, the mixture has not received enough lime. Add at least a third more lime after the test is satisfied.

If the "New Process" or ground limes are used, be sure they are fresh and not air-slaked. And never dump the dry lime into the sulphate solution, but first make a dilute milk of lime in water.

It is safe and often desirable to use the poison insecticides with Bordeaux mixture.

No. 6. SODA-BORDEAUX—Strength I—

Soda.....	2 pounds
Lime.....	$\frac{1}{2}$ to $\frac{3}{4}$ pound
Copper Sulphate.....	6 pounds
Water.....	60 gallons

Commercial soda lye may be used, but the mixture must be tested to insure its alkalinity. The amount of lime may in some cases be slightly diminished according to strength of the lye.

Dissolve and dilute the lye to 10 or 15 gallons and pour into the copper solution and then add lime as required,

Paris Green may be safely used in connection with this mixture.

No. 7. BORDEAUX MIXTURE, WITH PARIS GREEN — Strength 1—

Paris Green	5 to 8 ounces
Lime5 pounds
Copper Sulphate5 pounds
Water	50 gallons

To prevent potato rot, 6 pounds of copper sulphate is used instead of 5.

If the mixture is to be used on peach foliage it is advisable to add 2 pounds of lime in the above formula. When applied to such plants as carnations or cabbages it will adhere better if about a pound of hard soap be dissolved in hot water and added to the mixture. Used for rots, moulds, mildews, and all fungous diseases. If New Process lime is used, no slacking is necessary.

No. 8. IRON SULPHATE AND SULPHURIC ACID SOLUTION—

Iron Sulphate (Copperas)	110 pounds
Sulphuric Acid	1 quart
Hot water	26 gallons

Add the acid to the copperas and pour on the water. Use when fresh. To be used only as a wash before the buds swell, applied with brush or sponge. Its chief value is for grape anthracnose.

No. 9. AMMONIACAL COPPER CARBONATE—

Copper Carbonate	5 ounces
Ammonia (26 deg. Beaume) about	3 pints
Water	45-50 gallons

Make the paste of Copper Carbonate with a little water and dilute the ammonia with 7 to 8 volumes of water. Add the diluted ammonia to the paste, but be careful to use only enough to dissolve all the Copper Carbonate. Allow the solution to settle and use only the clear blue liquid. This loses strength on standing in open vessels, but may be kept indefinitely in a stoppered bottle. For spraying dilute to 45 to 50 gallons.

For use late in the season when Bordeaux mixture may stain the fruit. It is also best adapted for greenhouse spraying.

To make Copper Carbonate: Dissolve 10 pounds copper sulphate (blue vitriol) in 10 gallons of water, also 12 pounds carbonate of soda in same quantity of water. When cool, mix the two solutions slowly, stirring well. Allow the mixture to stand 12 hours and settle, after which pour off the liquid. Add the same quantity of water as before, stir, and allow to stand the same length of time. Repeat the operation again, after which drain, and dry the blue powder, which is copper carbonate.

Poison Insecticides or Arsenites

(For Insects that Chew)

No. 10. Paris Green —

Paris Green	1 pound
Water	150-300 gallons
Quicklime	2 to 3 pounds

The usual strength for summer spraying is $\frac{1}{4}$ pound per barrel (about 45 gallons). Lime should always be added to a Paris Green mixture to avoid burning the foliage. Peaches and Japan plums are most liable to injury. Stir the mixture frequently when spraying. A common method is to apply the Paris Green in Bordeaux as for apple scab and the codling moth.

Paris Green and the Bordeaux mixture can be applied together with perfect safety. Use at the rate of 4 ounces of the arsenites to 50 gallons of the mixture. The action of neither is weakened and the Paris Green loses all caustic properties.

For the destruction of insects that eat the foliage or fruit, Paris Green is a valuable remedy. It can be used in water in the above proportions, the stronger mixture being used for potatoes, while for fruits it is seldom advisable to use more than one pound in 200 gallons of water, unless in connection with lime water or Bordeaux mixture. It is always advisable to first form a paste with a small amount of water before preparing it for spraying. For low plants Paris Green may be used in a powdered form, either alone or with one hundred times its weight of plaster. London Purple is sometimes used in place of Paris Green, but is more apt to injure the foliage.

No. 11. ARSENIC, SAL SODA SOLUTION—

Destroys leaf-eating insects — a substitute for Paris Green.

White Arsenic	2 pounds
Sal Soda	6 pounds
Rein Water	2 gallons

Boil about 30 minutes or until clear, then use $1\frac{1}{4}$ pints to 40 gallons of water, adding 3 pounds of New Process lime. Kills potato bugs and other leaf eaters.

One pint of this stock solution and 2 pounds of slaked lime added to a barrel of water is equal in insecticidal value to $\frac{1}{4}$ pound Paris Green and costs only half as much.

It may be used with Bordeaux mixture, same as Paris Green, using 1 quart of above stock solution to 50 gallons of Bordeaux.

Always label the stock solution "Poison", and put it out of the reach of children.

No. 12. LONDON PURPLE—

This is used in the same proportion as Paris Green, but as it is more caustic it should be applied with two or three times its weight of lime, or with the Bordeaux mixture. The composition of London Purple is variable, and unless good reasons exist for supposing that it contains as much arsenic as Paris Green, use the latter poison. Do not use London Purple on peach or plum trees unless considerable lime is added.

No. 13. OTHER POISONS—

Green Arsenoid and Paragrene are more bulky and finer than Paris Green, and when of good quality they are just as effective and require less agitation.

Arsenic of Lead or "Disparene" can be applied in large quantities without injury to the foliage; hence it is very useful against beetles and similar insects that are hard to poison. It also adheres to the foliage a long time. Use in strengths varying from 1 to 4 pounds to 50 gallons of water.

No. 14. ARSENITE OF LIME

This has the threefold advantage of being cheap, the amount of arsenic is under perfect control, and it does not burn the foliage. It is made by boiling together for 45 minutes:—

White Arsenic	1 pound
Fresh Lime	2 pounds
Water	1 gallon

This may be kept in a tight vessel and used as desired. Thoroughly stir the material before using. For most insects, one quart of the above per barrel will be sufficient. Arsenite of lime is insoluble in water and, at this strength, will not injure the foliage of any orchard fruit. The insecticide is growing in popularity. Some green dye-stuff should be mixed with it to prevent the ever-present danger of mistaking it for some other material.

No. 15. HELLEBORE—

Fresh white Hellebore	1 ounce
Water	3 gallons

Apply when thoroughly mixed. This poison is not so energetic as the arsenites, and may be used a short time before the sprayed portions mature.

No. 16. PYRETHRUM OR RUHACH—

Pure fresh Pyrethrum	1 ounce
Water	5 gallons

Valuable against both chewing and sucking insects, especially upon maturing fruits or vegetables, and upon flowering plants. It can also be applied in a powder form with a bellows.

Hellebore and Pyrethrum are used chiefly on ripening fruit, as they lose their poisonous properties when exposed to the air for a few hours.

Contact Insecticides

(For Sucking Insects and San Jose Scale)

No. 17. LIME, SALT, AND SULPHUR—

The best treatment for San Jose scale.

Lime	15 pounds
Salt	15 pounds
Sulphur	15 pounds
Water	50 gallons

The above mixture can be prepared in different quantities by using a proportionate amount of each.

This is prepared in the following manner: Place the full amount of lime in a kettle or vat and start it to slake in hot water, using enough to prevent the lime from being air-slaked but not enough to drown it. During the slaking process add the sulphur, all lumps having first been pulverized, then the salt; stir both of them in thoroughly and add water gradually to reduce the mixture to a thin paste. If the mixture is not already boiling, bring it to this point and allow it to boil for one hour, stirring frequently to prevent burning to the side of the vessel. After one hour's boiling, add enough water to make 50 gallons of the mixture. When emptying into the spraying barrel, it should be passed through a fine wire screen to remove all sediment. If possible, apply to the trees while hot.

It requires about 3½ gallons of the wash for a full grown apple tree.

To be used only before buds begin to open.

No. 18. OREGON WASH—

Lime	15 pounds
Sulphur	15 pounds
Copper Sulphate (Blue Vitriol)	1½ pounds
Water	50 gallons

To be mixed similar to lime, salt and sulphur formula.

No. 19. LIME-SULPHUR—

Lime	20 pounds
Sulphur	15 pounds
Water to make	50 gallons

Boil one to two hours with a small quantity of water, then dilute to 50 gallons with boiling water. Do not let mixture become cold; spray while yet warm. For winter or early spring use.

No. 20. DISTILLATE EMULSION—

Whale Oil Soap	1½ pounds
Boiling Water	5 gallons
Distillate, untreated "28 deg. gravity"	5 gallons

The soap is dissolved in the hot water, the distillate added, and the whole thoroughly emulsified by means of a power pump, until a rather heavy, yellowish creamy emulsion is produced. For lemon trees use 1 gallon of emulsion to 12 gallons of water, and for orange trees, 1 gallon of emulsion to 15 gallons of water.

No. 21. KEROSENE EMULSION—

Whale Oil Soap	½ pound
Boiling Water	1 gallon
Kerosene	2 gallons

Dissolve the soap in the water, add the kerosene, and churn with a pump for 5 or 10 minutes. Dilute 4 to 25 times before applying. Use strong emulsion for all scale insects in March or April. For such insects as plant lice, mealy bugs, red spider, thrips, weaker preparations will prove effective. Cabbage worms, currant worms, and all insects which have soft bodies, can also be successfully treated. It is advisable to make the emulsion shortly before it is used.

No. 22. TOBACCO WATER—

Boil stems and strain liquid. Add water to make 2 gallons of liquid to each pound of stems used. For soft-bodied insects, the efficiency of Tobacco Water will be increased by stirring in one pound of whale oil soap to each 50 gallons.

No. 23. WHALE OIL SOAP—

Strength (a). For San Jose Scale During Dormant Season

Whale Oil Soap	2 pounds
Water	1 gallon

Strength (b). For Plants in Foliage

Whale Oil Soap	1 pound
Water	7 gallons

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